

Appl. No.: 09/730,327
Amdt. Dated: June 12, 2005
Off. Act. Dated: January 12, 2005

AMENDMENTS TO THE CLAIMS:

A detailed listing of all claims that are, or were, in the application follows:

1. (currently amended): An anti-collision system for use within a motorized vehicle, comprising:

means for sensing the urgency with which the brakes of a first vehicle are being activated and generating a first alert signal in response thereto;

a visual indicator directed rearwardly of said first vehicle and configured to respond to said first signal; [[and]]

means for rearwardly communicating said first alert signal as a second alert signal, in the radio-frequency signal spectrum, said second signal configured to include vehicle position related data for qualifying said second alert signal upon receipt by anti-collision systems within vehicles following said first vehicle toward providing advance warning to drivers for the avoidance of collisions;

wherein said position related data for qualifying said second alert signal comprises heading information and/or locating coordinates of said vehicle generating said second alert signal;

wherein upon receipt said position related data may be compared with heading and/or locating coordinates by the anti-collision system within another vehicle and said alert signal ignored if generated from a sufficiently different heading or location; and

wherein said means for rearwardly communicating is adapted for generating multiple levels of alert severity, including crash events associated with a collision along with levels of hard braking and swerving.

2. (original): An anti-collision system as recited in claim 1, wherein the means for sensing the urgency of said brake activation comprises a pressure sensor responsive to the pressure with which the brake is being applied.

3. (original): An anti-collision system as recited in claim 1, wherein the means for sensing the urgency of said brake activation comprises an acceleration sensor responsive to the acceleration to which the brake pedal is being subjected.

4. (previously presented): An anti-collision system as recited in claim 1, wherein said visual indicator comprises a circuit adapted for activating the reverse lights of said vehicle in response to said first alert signal and of being seen from behind said vehicle.

5. (previously presented): An anti-collision system as recited in claim 1, wherein said means for rearwardly communicating said first alert signal comprises a remote communications link adapted for generating second alert signals which include signal retransmission control data for limiting the dissemination of said alert signals.

6. (currently amended): An anti-collision system for communicating events from a first vehicle to secondary vehicles following said first vehicle for increasing the available reaction time provided to the drivers of said secondary vehicles, comprising:

a sensor configured for attachment to the braking system of said first vehicle and configured to generate an alert signal in response to the urgency with which the brakes are applied by the driver of said first vehicle;

a visual indicator directed rearwardly from said first vehicle which is adapted to annunciate said alert signal;

a controller operably coupled to said sensor and configured to remotely communicate said alert signal including signal regeneration data to activate event indicators within secondary vehicles;

wherein event signal regeneration is controlled by the transmission of a regeneration limiter value encoded within the transmitted event signal that limits the number of consecutive times that said alert signal may be retransmitted by a controller not associated with the vehicle originally registering the event; and

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wherein said limitation on consecutive number of retransmissions depends on which of multiple severity levels the alert signal belongs.

7. (previously presented): An anti-collision system as recited in claim 6, wherein the urgency of brake application is characterized by said sensor responding to changes in applied brake pedal pressure.

8. (currently amended): An anti-collision system as recited in claim 6, wherein said sensor is mounted to the brake pedal, or within the linkages connecting to the brake pedal.

9. Canceled.

10. (previously presented) An anti-collision system as recited in claim 6, wherein the urgency of brake application is characterized by said sensor in response to brake pedal accelerations.

11. Cancelled.

12. (previously presented): An anti-collision system as recited in claim 6, wherein said visual indicator is modulated on and off by said controller to increase recognition.

13. (previously presented): An anti-collision system as recited in claim 6, wherein said visual indicator comprises the reverse lights of said first vehicle.

14. (previously presented): An anti-collision system as recited in claim 6, wherein said remote communication of said alert signal by said controller is comprising a

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communications link operably connected with said controller through which the alert event indicator located on another, second, vehicle is capable of being activated.

15. (previously presented): An anti-collision system as recited in claim 14, wherein the communications link is configured with a communications protocol in which a multiplicity of senders and signal regenerators are synchronized to the event being generated from a primary signal generator located the farthest forward within a group of vehicles.

16. (previously presented): An anti-collision system as recited in claim 14, wherein said communications protocol comprises a multiplicity of time slots selected for event signal transmission by said controllers within anti-collision system of additional vehicles proximal to said first vehicle.

17. (previously presented): An anti-collision system as recited in claim 16, wherein said event signal transmissions are oriented substantially for rearward projection from said first vehicle such that the associated event signal generated by said first vehicle is directed for reception by vehicles following said first vehicle.

18. (previously presented): An anti-collision system as recited in claim 16, wherein the controller is configured to provide event signal communication of a single event as periodic transmissions within a selected time slot wherein signal interference with alert signals generated from other of said anti-collision systems is prevented.

19. (original): An anti-collision system as recited in claim 18, wherein the period between transmissions within the periodic transmission of an event signal is temporally offset such that event signals generated from other of said vehicles in

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response to a simultaneous event are not subject to continued interference with one another, but are shifted apart so as not to continue overlapping.

20. (original): An anti-collision system as recited in claim 19, wherein the temporal offset is restricted to allow event transmission within slotted intervals which are based on an event being generated, wherein event transmissions synchronize themselves in relation to an event being generated.

21. (previously presented): An anti-collision system as recited in claim 6, wherein said controller is configured to encode multiple discrete levels of severity data within the event signal for communication to said secondary vehicles.

22. (previously presented): An anti-collision system as recited in claim 6, wherein said controller is configured to encode identification data allowing event signals generated from different vehicles to be distinguished from one another.

23 - 25. Cancelled.

26. (currently amended): An anti-collision system as recited in claim ~~[[25]]~~, 6 wherein said regeneration limiter value comprises a count value encoded into the event signal and set to a first value upon first transmission from said first vehicle and which is subsequently altered by additional anti-collision systems responsive to said first transmission within additional vehicles, wherein these system are configured to further regenerate the signal until the count value reaches a final value whereupon receipt of the event signal with the final count value prevents further event signal regeneration.

27. Cancelled.

28. (previously presented): An anti-collision system as recited in claim 6, further comprising a crash detection sensor operably connected to said controller and configured to generate a crash event signal in response to detection of a crash.

29. (original): An anti-collision system as recited in claim 28, wherein said crash detection sensor comprises an acceleration sensor capable of sensing levels of acceleration commensurate with impact collisions.

30. (original): An anti-collision system as recited in claim 28, wherein said crash detection sensor comprises a signal generated by airbag circuitry within the vehicle which is activated in response to airbag deployment.

31. (previously presented): An anti-collision system as recited in claim 6, further comprising a swerve sensor operably connected to said controller, said swerve sensor generating a swerve signal which is capable of initiating event signal generation by said controller in response to a sufficient amount of detected swerve and of conditioning the response of the controller.

32. (previously presented): An anti-collision system as recited in claim 6, further comprising a direction sensor operably connected to said controller and a direction of travel for said first vehicle is encoded within event signals being communicated.

33. (currently amended): An anti-collision system as recited in claim 6, wherein the event indicator located in said secondary vehicles is adapted to provide [[a]] an audio and/or visual indication of said alert signal ~~which is visible~~ to the drivers of said secondary vehicles.

34. Canceled.

35. (previously presented): An anti-collision system as recited in claim 6, wherein said event indicator located in the second vehicle is responsive to the severity level encoded within said event signal wherein feedback as to the importance of the alert may be provided to the drivers of said secondary vehicles.

36. (previously presented): An anti-collision system as recited in claim 6, wherein the event indicator is configured for indicating roadway condition messages which are received as event signals from roadside devices and emergency vehicles equipped to generate roadway condition event signals.

37. (original): An anti-collision system as recited in claim 36, wherein the event indicator configured for indicating roadway condition messages is a visual display comprising at least one array of display elements adapted for displaying text and/or graphics.

38. (original): An anti-collision system as recited in claim 37, wherein the visual display further comprises a compass display capable of displaying vehicle heading.

39. (previously presented): An anti-collision system as recited in claim 6, further comprising a speed sensor connected to the said controller, wherein event signal generation is fully or partially responsive to the output of the speed sensor, such that braking activity which occurs within slow moving vehicles, as in parking lots adjacent to a roadway, does not unnecessarily alert drivers on the roadway.

40. (previously presented): An anti-collision system as recited in claim 6, further comprising a GPS positioning system connected to said controller for enhancing event qualification by embedding position data within the transmitted event signals and for

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qualifying received event signals by comparing the position of the vehicle issuing the event with the vehicle within which the event signal has been received.

41. (previously presented): An anti-collision system as recited in claim 6, further comprising a range detection device operably connected to said controller and capable of determining the distance to the vehicle being followed such that the controller may detect impending crash situations and respond to events in a manner consistent with the amount of following distance that exists.

42. (previously presented): An anti-collision system as recited in claim 6, wherein the communication link is configured for transmitting event signals which are capable of being received within a properly configured call box unit, or similarly configured receiver, that is configured to receive event signals and communicate significant event information over a communication channel to personnel, such as may be dispatched to the scene.

43. Cancelled.

44. (previously presented): An anti-collision system as recited in claim 6, wherein upon receipt of an event signal over the communications link the controller is capable of generating a signal to the cruise control for releasing the pressure on the accelerator pedal, so that the car can begin to decelerate immediately upon receipt of the event signal.

45. (previously presented): An anti-collision system as recited in claim 6, further comprising an error detection circuit which monitors the operation of said controller and is capable of shutting down portions, or the entire, circuit of the controller in response to detected errors.

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46. (previously presented): An anti-collision system as recited in claim 45, wherein the error detection unit connected to said controller is adapted for receiving additional status inputs on vehicle conditions and storing event signal information along with status inputs within digital memory for later recall.

47. (currently amended): An anti-collision system as recited in claim 6, further comprising an automatic mute circuit connected to said controller and capable of muting the audio output of the sound system of said vehicle in response to the controller receiving an event signal of sufficient severity, ~~wherein the driver can be alerted to approaching emergency vehicles which are generating an event signal, as well as to severe roadway conditions requiring the driver's full attention.~~

48. (previously presented): An anti-collision system as recited in claim 6, further comprising an automatic braking mechanism connected to said controller which is capable of activating the vehicle's brakes, wherein said controller is configured for activating the automatic braking mechanism detecting a sufficient alert condition.

49. (previously presented): An anti-collision system as recited in claim 6, further comprising an accelerator pedal sense input to said controller, wherein said controller is capable of discerning the level of acceleration to which the vehicle is subject, and can additionally discern changes to acceleration, and abrupt releases of the accelerator pedal pressure which may be indicative of a process of hard braking, said controller being configured for conditioning outputs, such as hard braking indicators, communication links, and mechanisms for automatically engaging the brakes in response thereto.

Claims 50-66 Cancelled.

67. (currently amended): An anti-collision system for use within motor vehicles, comprising:

means for sensing the urgency with which the brakes of the vehicle are being applied and generating alert signals in response thereto;

a radio-frequency communication link directed rearwardly from a primary vehicle transmitting alert signals, along with position related data including direction of travel (heading) information for qualifying the alert signal, rearwardly to secondary vehicles receiving alert signal transmissions from vehicles further ahead;

an alert indicator adapted for annunciating said alert signal within a vehicle receiving said alert signal transmission;

a controller circuit operable connected to said means for sensing, said radio-frequency communication link, and said alert indicator, and adapted to transmit said alert signals in response to sufficiently urgent levels of braking;

wherein said controller compares its position information with that contained within said position related data to determine if an alert indication is to be generated and if the alert signal is to be regenerated.

68. (previously presented): An anti-collision system as recited in claim 67, wherein said means for sensing the urgency with which the brakes of vehicle are being applied comprises a pressure sensor adapted for registering the pressure being applied by the driver to the face of the brake pedal.

69. (previously presented): An anti-collision system as recited in claim 67, wherein said means for sensing the urgency with which the brakes of vehicle are being applied comprises an acceleration sensor adapted for registering the acceleration of the brake pedal in response to the urgency which the brake is being applied.

70. (previously presented): An anti-collision system as recited in claim 69, wherein said pressure sensor is utilized in combination with said acceleration sensor, whereby urgency may be qualified.

71. (previously presented): An anti-collision system as recited in claim 67, wherein said controller correlates multiple braking sensors prior to communicating an alert signal therefrom.

72. (previously presented): An anti-collision system as recited in claim 67, wherein said alert indicator comprises a visual display, audio annunciator, or combination thereof.

73. (previously presented): An anti-collision system as recited in claim 72, further comprising an alert sensitivity selector wherein the driver of a vehicles subject to responding to received said alert signals can select the alert signal conditions for which an alert indication will be generated.

74. (previously presented): An anti-collision system as recited in claim 72, wherein a sound muting circuit is controlled by said controller for reducing sound being generated within said vehicle such that said audio annunciator may be easily heard when generating alert signal annunciations.

75. (previously presented): An anti-collision system as recited in claim 67, further comprising an annunciator adapted for indicating the presence of said alert signals registered by said primary vehicle.

76. (previously presented): An anti-collision system as recited in claim 75, wherein said annunciator comprises a rearward directed signal light.

77. (previously presented): An anti-collision system as recited in claim 75, wherein said rearward directed signal light is operably connected to said controller which is adapted for rapidly modulating the intensity of said signal light to increase driver recognition thereof.

78. (previously presented): An anti-collision system as recited in claim 77, further comprising a circuit for combining said alert signal with the output of the reversing lights within said vehicle wherein said alert signal may be annunciated on said reversing lights in combination with their normal functionality.

79. Cancelled.

80. (previously presented): An anti-collision system as recited in claim 67, wherein said position information comprises coordinate information from a locating means.

81. (previously presented): An anti-collision system as recited in claim 80, wherein said locating means comprises a global positioning system.

82. (previously presented): An anti-collision system as recited in claim 81, wherein said controller is adapted to communicate said alert signals to a display associated with operating said global positioning system.

83. (previously presented): An anti-collision system as recited in claim 67, wherein said radio-frequency communication link is further adapted with transceivers for communicating bi-directionally, both in a rearward direction and a forward direction.

84. (previously presented): An anti-collision system as recited in claim 67:
wherein said radio-frequency communication link generates said alert signal
which includes regeneration control data for controlling the extent to which the alert is
retransmitted by following vehicles;
wherein said controller is adapted to allow only the alert signals of highest
severity to be retransmitted to additional following vehicles;
wherein regeneration control data comprises a regeneration count that controls
the extent of retransmissions of said alert signals.

85. (previously presented): An anti-collision system as recited in claim 67,
wherein said radio-frequency communication link is operated on a time slot basis, with
said alert signal generation synchronized to the farthest forward, primary, vehicle
generating said alert signal transmissions, whereby overlapping transmissions are
prevented.

86. (previously presented): An anti-collision system as recited in claim 67, further
comprising means for registering additional alert conditions for communication to
following vehicles.

87. (previously presented): An anti-collision system as recited in claim 86,
wherein said additional alert condition is selectable from the group of vehicle conditions
consisting essentially of:

means for sensing vehicle swerving which is adapted to generate said alert
signal indication upon registering a sufficient swerve rate for transmission by said radio-
frequency communication link; [[and]]

a crash sensor adapted for registering collision of associated vehicle, wherein
said crash may cause deployment of vehicle airbag and be registered by the airbag
deployment sensors;

a signal generated in response to emergency flasher activation; and
a signal associated with an alertive signal generated by emergency vehicles.

88. (previously presented): An anti-collision system as recited in claim 67, wherein said controller is adapted for mapping causative events into multiple categories and/or levels of severity.

89. (previously presented): An anti-collision system as recited in claim 88, wherein said multiple levels of severity include a level associated with crash events associated with an accident that has occurred, and levels of hard braking and/or swerving.

90. (previously presented): An anti-collision system as recited in claim 67, further comprising an error monitoring circuit which is operably connected to said controller and adapted for verifying proper operation of said anti-collision system and disabling all or part of the functionality of said system if improper operation is detected.

91. (previously presented): An anti-collision system as recited in claim 67, further comprising a means for registering following distance to a preceding vehicle which is operably coupled to said controller.

92. (previously presented): An anti-collision system as recited in claim 91, further comprising an assisted braking mechanism operable coupled to said controller which activates vehicle braking in response to said alert signal and said registered following distance.

93. (previously presented): An anti-collision system as recited in claim 92, further comprising a tailgate distance selector, wherein a driver may control the relative car

length distances at which alertive indications are generated.

94. (previously presented): An anti-collision system as recited in claim 67, further comprising a forward looking audio correlation system which registers and analyzes audio arriving toward the front of said vehicle and is adapted for generating an alert signal if an event of sufficient severity is detected.

95. (previously presented): An anti-collision system as recited in claim 94, wherein said event of sufficient severity is selected from the group of alert conditions consisting of braking, hard braking, brake squeeling, and collisions.

96. (currently amended): An anti-collision system for use within motor vehicles, comprising:

means for sensing the urgency with which the brakes of the vehicle are being applied based on pressure and/or acceleration and generating alert signals in response thereto;

a radio-frequency communication link directed rearwardly from a primary vehicle transmitting alert signals, ~~along with heading and/or location information, and regeneration control data for qualifying the alert signal,~~ rearwardly to secondary vehicles receiving alert signal transmissions from vehicles further ahead;

an alert indicator adapted for annunciating said alert signal on a visual display and/or audio annunciator within a vehicle receiving said alert signal transmission;

a controller circuit operably coupled to said means for sensing, said radio-frequency communication link, and said alert indicator, said controller circuit configured to transmit said alert signals in response to sufficiently urgent levels of braking;

~~wherein said controller compares its heading and/or location information with that communicated within said alert signal to determine if an alert indication is to be generated and if the alert signal is to be regenerated;~~

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~~wherein said controller examines said regeneration data to determine if said alert signal is to be regenerated to subsequent vehicles, and modifies the regeneration value to reduce subsequent retransmissions if regeneration is to occur~~

an alert sensitive circuit including an alert sensitivity selector and/or automatic mute circuit;

wherein said alert sensitivity selector is configured for operation by the driver of a vehicle which is subject to responding to received said alert signals, wherein said driver can select the alert signal conditions for which an alert indication will be generated by said alert indicator; and

wherein said automatic mute circuit is connected to said controller and configured for muting the audio output of a sound system within said vehicle in response to the controller receiving an alert signal of sufficient severity.

97. (currently amended): A vehicle anti-collision system, comprising:

means for sensing the urgency with which the brakes of a first vehicle are being activated and generating a first alert signal in response thereto;

a visual indicator directed rearwardly of said first vehicle and configured to respond to said first signal;

means for rearwardly communicating said first alert signal as a second alert signal, in the radio-frequency signal spectrum, said second signal configured to include vehicle position related data for qualifying said second alert signal upon receipt by anti-collision systems within vehicles following said first vehicle toward providing advance warning to drivers for the avoidance of collisions;

wherein said rearward communication means comprises a remote communications link adapted for generating second alert signals which include signal retransmission control data for limiting the regenerative dissemination of said alert signals;

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wherein said signal retransmission control data comprises the transmission of a regeneration limiter value encoded within the transmitted event signal that limits the number of consecutive times that said alert signal may be retransmitted by a controller not associated with the vehicle originally registering the event; and

wherein said limit is responsive to the severity level of the alert signal being transmitted.

98. (previously presented): An anti-collision system as recited in claim 97, wherein said means for sensing the urgency of said brake activation comprises a pressure sensor responsive to the pressure with which the brake is being applied and/or an acceleration sensor responsive to the acceleration to which the brake pedal is being subjected.

99 -100 Canceled.

101. (previously presented): An anti-collision system as recited in claim 97, wherein said vehicle position related data comprises data from a Global Positioning System (GPS) connected to said controller for enhancing event qualification by embedding position data within the transmitted event signals and for qualifying received event signals by comparing the position of the vehicle issuing the event with the vehicle within which the event signal has been received.

102. Canceled.

103. (new): An anti-collision system for communicating events from a first vehicle to secondary vehicles following said first vehicle for increasing the available reaction time provided to the drivers of said secondary vehicles, comprising:
a sensor configured for attachment to the braking system of said first vehicle and

configured to generate an alert signal in response to the urgency with which the brakes are applied by the driver of said first vehicle;

a radio-frequency communication link directed rearwardly from a primary vehicle transmitting alert signals to secondary vehicles receiving alert signal transmissions from vehicles further ahead;

an alert indicator adapted for annunciating said alert signal within a vehicle receiving said alert signal transmission;

a controller circuit operably connected to said means for sensing, said radio-frequency communication link, and said alert indicator, and adapted to transmit said alert signals in response to sufficiently urgent levels of braking; and

wherein said alert indicator is configured for indicating roadway condition messages which are received as event signals from roadside devices and emergency vehicles equipped to generate roadway condition event signals.

104. (new): An anti-collision system as recited in claim 103, wherein the event indicator configured for indicating roadway condition messages is a visual display comprising at least one array of display elements adapted for displaying text and/or graphics.

105. (new): An anti-collision system as recited in claim 104, wherein the visual display further comprises a display capable of displaying vehicle heading.

106. (new): An anti-collision system for communicating events from a first vehicle to secondary vehicles following said first vehicle for increasing the available reaction time provided to the drivers of said secondary vehicles, comprising:

a sensor configured for attachment to the braking system of said first vehicle and configured to generate an alert signal in response to the urgency with which the brakes are applied by the driver of said first vehicle;

a radio-frequency communication link directed rearwardly from a primary vehicle transmitting alert signals, along with position related data from a global positioning system for qualifying the alert signal, to secondary vehicles receiving alert signal transmissions from vehicles further ahead;

an alert indicator adapted for annunciating said alert signal within a vehicle receiving said alert signal transmission;

a controller circuit operably connected to said means for sensing, said radio-frequency communication link, and said alert indicator, and adapted to transmit said alert signals in response to sufficiently urgent levels of braking; and

wherein said controller is adapted to communicate received alert signals to a display associated with operating said global positioning system.

107. (new): An anti-collision system as recited in claim 106, wherein said position related data includes direction of travel information from said global positioning system.

108. (new): An anti-collision system as recited in claim 106:

wherein said radio communication link is configured for communicating event signals generated from a plurality of vehicles at regular intervals within event signal packets sent within one of a plurality of slots of a serial bit stream for receipt by any of a plurality of following vehicles; and

wherein data is included with each packet to indicate if the data packet is an active packet or a regenerated packet and the extent to which the data packet is to be regenerated.

109. (new): An anti-collision system as recited in claim 108:

wherein the first vehicle to signal an event within a given group is considered the primary event generator, whereas event signal packets are sent within time slots

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synchronized to said primary even generator and subsequent event generators and regenerators are synchronized with the event signals of the primary generator; and

whereas the controller is configured to resynchronize respondents within the serial bit stream to a new primary event generator, when an event signal is generated by a vehicle farther ahead than the original primary event generator.